

What is claimed is:

1. A recombinant MSP-1₄₂ protein which retains its native folding.

5

2. A composition comprising the recombinant *P. falciparum* MSP-1₄₂ of claim 1.

3. A recombinant vector comprising a DNA sequence
10 encoding MSP-1₄₂.

4. The vector of claim 3 wherein said DNA sequence is from *Plasmodium falciparum* 3D7.

15 5. The vector of claim 4 wherein said DNA sequence corresponds to SEQ ID NO:2.

6. The vector of claim 5 wherein said vector is pETATpFMSP-1₄₂.

20

7. A host cell transformed with the vector according to claim 6.

8. The host cell of claim 7 wherein said host is
25 *E. coli* BL21 (DE3).

9. A method for producing and purifying recombinant *P. falciparum* MSP-1₄₂ protein comprising:
growing a host cell containing a vector
30 expressing *P. falciparum* MSP-1₄₂ proteins in a suitable culture medium,

causing expression of said vector under suitable conditions for production of soluble MSP-1₄₂ protein and,

lysing said host cells and recovering said MSP-1₄₂ protein such that it retains its native folding.

10. The method of claim 9 wherein said expression
5 of said vector is by induction with IPTG at a temperature range of 24°C-27°C.

11. The method of claim 10 wherein said induction is at 25°C.

10

12. The method of claim 9 wherein lysing of cells is in the presence of imidazole.

13. The method of claim 9 further comprising
15 removal of *E. coli* endotoxin.

14. The method of claim 13 wherein said removal of endotoxin is by application to a Ni-NTA column.

20 15. An antibody produced against the recombinant MSP-1₄₂ protein of claim 1.

16. The antibody of claim 15 wherein said antibody is monoclonal or polyclonal.

25

17. A method for *in vitro* diagnosis or detection of malaria antigen present in a biological sample, comprising:

(i) contacting said biological sample with a MSP-
30 1₄₂ specific antibody, preferably in an immobilized form under appropriate conditions which allow the formation of an immune complex,

(ii) removing unbound components,

(iii) incubating the immune complexes formed with
35 heterologous antibodies which specifically bind to the

antibodies present in the sample to be analyzed, with said heterologous antibodies conjugated to a detectable label under appropriate conditions,

- (iv) detecting the presence of said immune
5 complexes visually or mechanically.

18. A kit for *in vitro* detection of a malaria antigen present in a biological sample, comprising:

- at least one antibody which react with
10 recombinant MSP-1₄₂, with said antibody being preferentially immobilized on a solid substrate,
a buffer, or components necessary for producing the buffer, enabling binding reaction between these antibodies and the malaria antigens present in the
15 biological sample, and
a means for detecting the immune complexes formed in the preceding binding reaction.

19. A recombinant protein according to any one of
20 claims 1 or 2, wherein said purified protein is at least 95% pure.

20. A recombinant protein according to any one of claims 1 or 2, wherein said purified protein
25 is at least 90% pure.

21. A recombinant protein according to claim 1 wherein said purified protein is at least 97% pure.

- 30 22. A recombinant protein according to claim 1 wherein said purified protein is at least 98% pure.

23. A recombinant protein according to claim 1 wherein said purified protein is at least 99% pure.

24. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 80% pure.

5 25. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 90% pure.

26. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 95% pure.

10

27. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 97% pure.

15 28. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 98% pure.

29. A recombinant MSP-1₄₂ protein according to claim 1 which is at least 99% pure.

20 30. An immunogenic carrier comprising a protein according to claim 1.

31. A method for *in vitro* diagnosis of malaria antibodies in a biological sample, comprising
25 (i) contacting said biological sample with a composition comprising a MSP-1₄₂ peptide according to claim 1 under appropriate conditions which allow the formation of an immune complex, wherein said peptide is labeled with a detectable label, and

30 (ii) detecting the presence of said immune complexes visually or mechanically.

32. A kit for determining the presence of malaria antibodies in a biological sample, comprising:

at least one peptide or protein composition
according to claim 1,

a buffer or components necessary for producing a
buffer;

5 means for detecting immune complexes formed
between the peptide and antibodies present in the
sample.

33. A method for *in vitro* monitoring malaria
10 infection or prognosing the response to treatment of
patients suffering from malaria infection comprising:

incubating a biological sample from a patient
with malaria infection with an MSP-1₄₂ protein
according to claim 1 or a suitable part thereof under
15 conditions allowing the formation of an immunological
complex,

removing unbound components,

calculating the anti-MSP-1₄₂ titers present in
said sample

20 and monitoring the natural course of malaria
infection, or prognosing the response to treatment of
said patient on the basis of the amount anti-MSP-1₄₂
titers found in said sample at the start of treatment
and/or during the course of treatment.

25

34. A kit for monitoring malaria infection or
prognosing the response to treatment of patients
suffering from malaria infection
comprising:

30 at least one MSP-1₄₂ peptide according to claim 1,
a buffer or buffer components

means for detecting the immune complexes formed
between the peptide and antibodies present in the
sample, and

optionally, a means for determining the amount of immune complex formed.

35. A vaccine against malaria comprising *P.*
5 *falciparum* MSP-1₄₂.

36. The vaccine of claim 35 wherein said *P.*
falciparum is 3D7.

10 37. The vaccine of claim 35 further comprising an adjuvant.

38. The vaccine of claim 37 wherein said adjuvant
is chosen from the group consisting of: montanide and
15 alum.

39. A method for inducing in a subject an immune
response against malaria infection comprising
administering to said subject a composition comprising
20 an immunologically effective amount of *P. falciparum*
MSP-1₄₂ in an acceptable diluent.

40. The method of claim 39 wherein said
composition further comprises an adjuvant.
25

41. The composition of claim 40 wherein said
adjuvant is selected from the group consisting of
montanide and alum.

30 42. The composition of claim 41 wherein said
adjuvant is montanide.

43. A method for inducing a protective immune
response to malaria in a mammal, comprising

administering a composition comprising a *P. falciparum* MSP-1₄₂ in an amount effective to induce an immune response in said mammal.

5 44. The method according to claim 43 wherein the composition further comprises an adjuvant selected from the group consisting of montanide and alum.

10 45. The method according to claim 43 wherein said *P. falciparum* is 3D7.

15 46. A multivalent vaccine for protection against infection with more than one strain of *P. falciparum* comprising MSP-1₄₂, said *P. falciparum* selected from the group consisting of 3D7, FVO and CAMP.

20 47. The multivalent vaccine of claim 46, further comprising an adjuvant selected from the group consisting of montanide and alum.

25

30